Test 1

Total mark 5

1 **Choose the correct answer from those given :** (3 marks)

1 The solution set of the equation : $x^2 = x$ in $\mathbb{R}$ is .....

ⓐ $\{0\}$ ⓑ $\{-1\}$ ⓒ $\{0 , 1\}$ ⓓ $\varnothing$

2 If $5^x = 7$, then 5^{x+1} = ...

ⓐ 7 ⓑ 8 ⓒ 35 ⓓ 45

3 If $(x - 5)^0 = 1$, then $x \in$ .....

ⓐ R ⓑ R – $\{5\}$ ⓒ R – $\{-5\}$ ⓓ $\{5\}$

2 **Simplify:** $\frac{4^{x+1} \times 9^{2-x}}{6^{2x}}$ (2 marks)

, then find the value of the result when $x = 1$

Test 2

Total mark 5

1 **Choose the correct answer from those given :** (3 marks)

1 The solution set of the equation : $x^2 + 4 = 0$ in $\mathbb{R}$ is .....

ⓐ $\{-4\}$ ⓑ $\{2 , -2\}$ ⓒ $\{-2\}$ ⓓ $\varnothing$

2 If $2^x = 5$, then 8^x = ...

ⓐ 5 ⓑ 15 ⓒ 25 ⓓ 125

3 If a (c + d) – b (c + d) = 20 and c + d = 4 , then a – b = ...

ⓐ 4 ⓑ 5 ⓒ 80 ⓓ 40

2 Find the positive real number which if we added its square to its three times , it becomes 28 (2 marks)

Test 3

Total mark 5

1 Choose the correct answer from those given : (3 marks)

1 If 3 is a root of the equation : $x^2 + k = 0$, then k = ...

ⓐ 3 ⓑ 9 ⓒ – 3 ⓓ – 9

2 If $3^x = 5$, $\frac{1}{3^y} = 7$, then 3^{x+y} = ...

ⓐ 35 ⓑ 12 ⓒ $\frac{7}{5}$ ⓓ $\frac{5}{7}$

3 If $7^{x+1} = 5^{1+x}$, then x = ...

ⓐ – 1 ⓑ 7 ⓒ 5 ⓓ 1

2 Find in $\mathbb{R}$ the S.S. of the following equations : (2 marks)

a $x^2 - 7x + 12 = 0$

b $2x^3 - 18x = 0$

Test 4

Total mark 5

1 Choose the correct answer from those given : (3 marks)

1 $3x^0$ = ... , $x \neq 0$

ⓐ 0 ⓑ 1 ⓒ 3 ⓓ $3x$

2 The S.S. of the equation : $x(x - 4) = 0$ in $\mathbb{R}$ is .....

ⓐ $\{0 , 4\}$ ⓑ $\{0 , -4\}$ ⓒ $\{0 , 2 , -2\}$ ⓓ $\{2 , -2\}$

3 $a x - c x - c y + a y = (x + y)$ (.....)

ⓐ $a + c$ ⓑ $a - c$ ⓒ $c - a$ ⓓ $2a + 2c$

2 Find the dimensions of a rectangle whose length is 4 cm. more than its width and whose area is 21 cm^2. (2 marks)

Test 5

Total mark 5

1 Choose the correct answer from those given : (3 marks)

1 If $7^{x} = 5$, then $7^{-x} =$ .....

ⓐ 5 ⓑ $\frac{1}{7}$ ⓒ $\frac{1}{5}$ ⓓ 35

2 Quarter of 2^{16} = ...

ⓐ 2^{4} ⓑ 2^{15} ⓒ 2^{14} ⓓ $\left(\frac{1}{2}\right)^{4}$

3 The solution set of the equation : $x(x-3) = 5x$ in $\mathbb{R}$ is .....

ⓐ $\{3\}$ ⓑ $\{0, 3, 5\}$ ⓒ $\{3, 5\}$ ⓓ $\{0, 8\}$

2 Simplify : $\frac{2^{2x} \times 3^{x-1}}{12^{x}}$ (2 marks)

Test 1

Total mark 5

1 Choose the correct answer from those given : (3 marks)

1 In ΔABC , $(AB)^2 = (BC)^2 + (AC)^2$, $m(\angle B) = 40°$, then $m(\angle A)$ = ...

ⓐ 50° ⓑ 70° ⓒ 100° ⓓ 80°

2 Two similar triangles , the ratio between the lengths of two corresponding sides in them is 5 : 3 , if the perimeter of the greater triangle is 60 cm. , then the perimeter of the smaller triangle is ..... cm.

ⓐ 3 ⓑ 36 ⓒ 100 ⓓ 5

3 If the area of a square is 50 $cm.^2$, then the length of its diagonal = ...

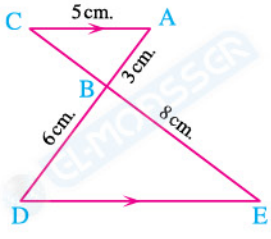
ⓐ 5 cm. ⓑ 10 cm.

ⓒ 20 cm. ⓓ 25 cm.

2 In the opposite figure : (2 marks)

$\overline{AC} // \overline{ED}$, $\overline{AD} \cap \overline{CE} = \{B\}$

, AC = 5 cm. , BE = 8 cm. , AB = 3 cm. and BD = 6 cm.



1 **Prove that :** $\Delta ABC \sim \Delta DBE$

2 **Find the length of each of :** $\overline{BC}$ and $\overline{ED}$

Test 2

Total mark 5

1 Choose the correct answer from those given : (3 marks)

1 All ..... are similar.

ⓐ triangles ⓑ squares ⓒ rhombus ⓓ rectangles

2 If the area of a trapezium is 108 cm.^{2} and the length of one of its parallel bases is 15 cm. and its height is 8 cm. , then the length of the other base is .....

ⓐ 27 cm. ⓑ 18 cm. ⓒ 15 cm. ⓓ 12 cm.

3 A rhombus whose diagonals lengths are 6 cm. , 8 cm. and its height is 4.8 cm. , then its side length is ..... cm.

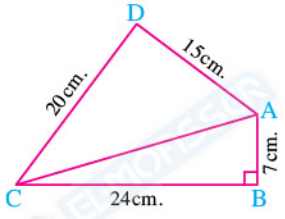
ⓐ 10 ⓑ 5 ⓒ 20 ⓓ 12

2 In the opposite figure : (2 marks)

ABCD is a quadrilateral in which :

AB = 7 cm. , AD = 15 cm. , BC = 24 cm.

, DC = 20 cm. , m (∠ B) = 90°



1 **Find :** The length of $\overline{AC}$

2 **Prove that :** m (∠ ADC) = 90°

Test 3

Total mark 5

1 Choose the correct answer from those given : (3 marks)

1 If the area of a rhombus is 30 cm.^{2} , the length of one of its diagonals is 6 cm. , then the length of the other diagonal = ...

ⓐ 5 cm. ⓑ 6 cm. ⓒ 10 cm. ⓓ 8 cm.

2 In Δ ABC if $(AB)^2 = (BC)^2 + (AC)^2$, m (∠ B) = 2 m (∠ A) , then m (∠ A) = ...

ⓐ 30° ⓑ 45° ⓒ 60° ⓓ 90°

3 If the ratio of enlargement between two similar polygons equals ..... , then the two polygons are congruent.

ⓐ 2 : 1 ⓑ 1 : 2 ⓒ 1 : 1 ⓓ 3 : 1

---

2 A trapezium whose area is 450 cm^2. If the lengths of its two parallel bases are 24 cm. and 12 cm. , then find its height. (2 marks)

Test 4

Total mark 5

1 Choose the correct answer from those given : (3 marks)

1 The trapezium in which the lengths of its two parallel bases are 7 cm. and 9 cm. , then its middle base is of length .....

ⓐ 16 ⓑ 32 ⓒ 8 ⓓ 2

2 In any two similar polygons , the lengths of their corresponding sides are .....

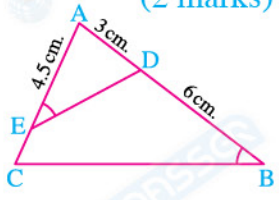
ⓐ alternate. ⓑ different.

ⓒ proportional. ⓓ equal.

3 The rhombus whose diagonals lengths are 6 cm. and 10 cm. its area = ... cm^2

ⓐ 60 ⓑ 30 ⓒ 15 ⓓ 10

2 In the opposite figure : (2 marks)



m (∠ AED) = m (∠ B) , AD = 3 cm. ,

AE = 4.5 cm. and BD = 6 cm.

1 **Prove that :** Δ ABC ~ Δ AED

2 **Find the length of :** $\overline{EC}$

Test 5

Total mark 5

1 Choose the correct answer from those given : (3 marks)

1 If $\Delta ABC \sim \Delta DEF$ and $AB = \frac{1}{3} DE$, then the perimeter of ΔABC = ... the perimeter of ΔDEF

ⓐ 3 ⓑ $\frac{1}{3}$

ⓒ 1 ⓓ $\frac{2}{3}$

2 If the perimeter of a rhombus is 24 cm. and its area is 30 cm^2 , then its height = ...

ⓐ 4 cm. ⓑ 5 cm.

ⓒ 6 cm. ⓓ 12 cm.

3 If the area of a trapezium is 24 cm^2 and its height is 4 cm. , then the length of its middle base = ...

ⓐ 6 cm. ⓑ 8 cm.

ⓒ 12 cm. ⓓ 16 cm.

2 In the opposite figure : (2 marks)

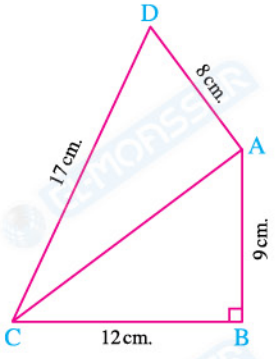
ABCD is a quadrilateral in which : m (∠ B) = 90° ,

AB = 9 cm. , BC = 12 cm. ,

CD = 17 cm. and DA = 8 cm.

Prove that : m (∠ DAC) = 90° ,

then find : The area of the figure ABCD



Answers of Test 1

1 1 (c) 2 (c) 3 (b)

2 $\frac{2^{2x+2} \times 3^{4-2x}}{2^{2x} \times 3^{2x}} = 2^{2x+2-2x} \times 3^{4-2x-2x} = 2^2 \times 3^{4-4x}$

When $x = 1$

$\therefore$ The value of the result $= 2^2 \times 3^{4-4} = 2^2 \times 3^0 = 4 \times 1 = 4$

Answers of Test 2

1 1 (d) 2 (d) 3 (b)

2 Let the number be x $\quad \therefore x^2 + 3x = 28$

$\therefore x^2 + 3x - 28 = 0$ $\quad \therefore (x-4)(x+7) = 0$

$\therefore x - 4 = 0$ $\quad \therefore x = 4$

or $x + 7 = 0$ $\quad \therefore x = -7$ (refused)

$\therefore$ The number is 4

Answers of Test 3

1 1 (d) 2 (d) 3 (a)

2 **(a)** $(x-3)(x-4) = 0$

$\therefore x - 3 = 0$ $\quad \therefore x = 3$

or $x - 4 = 0$ $\quad \therefore x = 4$

$\therefore$ The S.S. $= \{3, 4\}$

(b) $2x(x^2 - 9) = 0$ $\quad \therefore 2x(x-3)(x+3) = 0$

$\therefore 2x = 0$ $\quad \therefore x = \frac{0}{2} = 0$

or $x - 3 = 0$ $\quad \therefore x = 3$

or $x + 3 = 0$ $\quad \therefore x = -3$

$\therefore$ The S.S. $= \{0, 3, -3\}$

Answers of Test 4

1 1 (c) 2 (a) 3 (b)

2 Let the width of the rectangle be x cm.

$\therefore$ The length of the rectangle is $(x + 4)$ cm.

$\therefore x(x + 4) = 21$

$\therefore x^2 + 4x - 21 = 0$

$\therefore (x + 7)(x - 3) = 0$

$\therefore x + 7 = 0$, then $x = -7$ (refused)

or $x - 3 = 0$, then $x = 3$

$\therefore$ The width = 3 cm. and the length = 7 cm.

Answers of Test 5

1 1 (c) 2 (c) 3 (d)

2 $\frac{2^{2x} \times 3^{x-1}}{2^{2x} \times 3^{x}} = 3^{x-1-x} = 3^{-1} = \frac{1}{3}$

Answers of Test 1

1 1 (a) 2 (b) 3 (b)

2 $\because \overline{AC} // \overline{ED}$, $\overleftrightarrow{AD}$ is a transversal to them.

$\therefore$ m ($\angle$ A) = m ($\angle$ D) (alternate angles) (1)

$\because \overline{AC} // \overline{ED}$, $\overleftrightarrow{CE}$ is a transversal to them.

$\therefore$ m ($\angle$ C) = m ($\angle$ E) (alternate angles) (2)

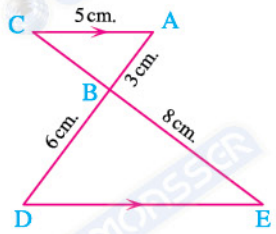
$\because$ m ($\angle$ ABC) = m ($\angle$ EBD) (V.O.A) (3)

From (1) , (2) , (3) :

$\therefore \Delta ABC \sim \Delta DBE$ (the first req.)

$\therefore \frac{AB}{DB} = \frac{BC}{BE} = \frac{CA}{ED}$ $\therefore \frac{3}{6} = \frac{BC}{8} = \frac{5}{ED}$

$\therefore$ BC = 4 cm. , DE = 10 cm. (the second req.)



Answers of Test 2

1 1 (b) 2 (d) 3 (b)

2 In Δ ABC :

$\because$ m ($\angle$ B) = 90°

$\therefore (AC)^2 = (7)^2 + (24)^2 = 49 + 576 = 625$

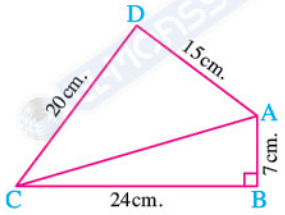
$\therefore$ AC = 25 cm. (the first req.)

In Δ DAC :

$\because (DA)^2 + (DC)^2 = (15)^2 + (20)^2 = 225 + 400 = 625$

$\therefore (DA)^2 + (DC)^2 = (AC)^2$

$\therefore$ m ($\angle$ ADC) = 90° (the second req.)



Answers of Test 3

1 1 (c) 2 (a) 3 (c)

2 The area of the trapezium = $\frac{1}{2}(\ell_1 + \ell_2) \times h$

$\therefore 450 = \frac{1}{2}(24 + 12) \times h$ $\therefore 450 = 18 \times h$ $\therefore h = 25$ cm.

Answers of Test 4

1 1 (c) 2 (c) 3 (b)

2 In Δ ABC , AED :

$\because$ m ($\angle$ B) = m ($\angle$ AED) , $\angle$ A is a common angle

$\therefore$ m ($\angle$ C) = m ($\angle$ ADE)

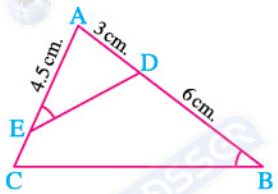
$\therefore \Delta ABC \sim \Delta AED$ (the first req.)

$\therefore \frac{AB}{AE} = \frac{AC}{AD}$

$\therefore \frac{9}{4.5} = \frac{AC}{3}$

$\therefore AC = \frac{3 \times 9}{4.5} = 6$ cm.

$\therefore EC = 6 - 4.5 = 1.5$ cm. (the second req.)



Answers of Test 5

1 1 (b) 2 (b) 3 (a)

2 In Δ ABC :

$\because$ m ($\angle$ B) = 90°

$\therefore (AC)^2 = (AB)^2 + (BC)^2 = 81 + 144 = 225$

$\therefore AC = 15$ cm.

In Δ DAC :

$\because (AC)^2 = 225$, $(AD)^2 = 64$, $(DC)^2 = 289$

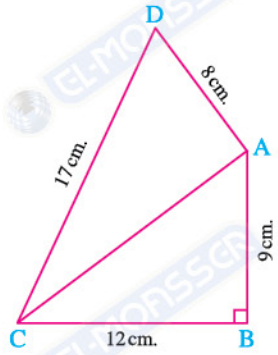
$\therefore (DC)^2 = (AD)^2 + (AC)^2$

$\therefore$ m ($\angle$ DAC) = 90° (The first req.)

$\because$ the area of the figure ABCD = (the area of Δ ABC) + (the area of Δ DAC)

$\therefore$ the area of the figure ABCD = $(\frac{1}{2} \times 9 \times 12) + (\frac{1}{2} \times 8 \times 15)$

$= 54 + 60 = 114$ cm^2 (The second req.)



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Unit 1: Factroization

Lesson 6: Factroizing by grouping

Board Summary

1) $ax + bx + ay + by = x(a + b) + y(a + b) = (x + y)(a + b)$

2) **If** $a + b = 5, x + y = 7$

find using factorization the value of the expression $ax + bx + ay + by$

3) Factorize compeletly

$$x^2 + 4x + 4 - y^2$$

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Date: ……. /……. /…….

Evaluation

1- Complete

(a) $Lx + Ly + mx + my$ =…….( ) + ……. ( )

= ( )( )

(b) $a + b = 10$, $c + d = 3$ then the value of $ac + ad + bc + bd$ = ……

2- Factorize completely:

(1) $a^2 + ab + 2a + 2b$

(2) $x^3 - 3x^2 + 6x - 18$

(3) $xy + 5y + 7x + 35$

(4) $Lb + Lc - mb - mc$

(5) $x^2 - 10x + 25 - y^2$

(6) $x^2 - 6x + 9 - L^2$

(7) $x^5 - x^3 - x^2 + 1$

(8) $x^3 + x^2 + x + 1$

(9) $x^3 + 2xy + y^2 - 9$

Date: ……. /……. /…….

Homework

1- Complete

(a) $zx - zy + lx - ly = \ldots\ldots + \ldots\ldots$

(b)If $m + n = 10$, $d + e = 2$ then the value of $md + me + nd + ne = \ldots\ldots\ldots$

2- Factorize completely:

(1) $3ax + 3ay + 4bx + 4by$

(2) $x^2 - 10x + 25 - k^2$

(3) $x^2 - 3x^2 + 6x - 18$

(4) $a^3 + b^3 + 7a - 7b$

Remember

To factorize an experssion formed of 4 terms we divide the experessionsthen we take the H.C.F from each group.

Dat

Lesson 8: Solving 2nd degree equation in one variable in R

Board Summary

$$If\ ab = 0\ then\ a = 0\ or\ b = 0$$

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Choose the correct answer:

(1) *The S.S of the equations* $x^2 + 25 = 0$ *in R is* ... ... ({0}, {-5}, {± 5 }, $\emptyset$)

(2) *The S.S of the equations* $\frac{9}{x} = \frac{x}{4}$ *in R is* ... ... ({6}, {-6},{6, -6}, {4, 9})

(3) *The S.S of the equations* $x^2 - 7x + 12 = 0$ *in R is* ... ...

({4} , {3,4} , {3} , $\emptyset$)

Date: …..... /……... /…....

Evaluation

1- <u>Complete:</u>

(a) $\boldsymbol{The\ S.S\ of\ the\ equation x^2 + 9 = 0\ in\ R\ is}$ … … … … … . . …

(b) $\boldsymbol{The\ S.S\ of\ the\ equation\ x^2 - x = 0\ in\ R\ is}$ … … … … … . . …

2- <u>Find the S.S in R:</u>

$(a) x^2 - 5x + 6 = 0$

$(b)\ x(x-5) - 14 = 0$

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3- A real number if we add it to its square the result will be 12 find this number?

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4- A positive real number its square exceeds its three times by 40 find this number?

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Date: ……. /……. /…….

5- Two real numbers one of them exceeds the other by 4 if the product of them is 45 find these two numbers?

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Homework

1- <u>Complete:</u>

(a) $The\ S.S\ of\ the\ equation x^2 - 3x - 10 = 0\ in\ R\ is$ ----------

(b) $The\ S.S\ of\ the\ equation x^2 + 15 = 8x\ in\ Q\ is$ ----------

(c) $If\ 9\ is\ a\ root\ of\ the\ equation\ x^2 - 7x + b = 0\ then\ b =$ ----------

2- <u>Find the S.S in R:</u>

$(a)\ x^2 - 14x + 45 = 0$

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……

$(b)\ x(x-2) = 8$

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$(c)\ x^3 - 5x^2 + 6x = 0$

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Date: …..... /..…... /…....

3- A rectangle its length is more than its width by 4 cm and its area is 21 cm^2.Find its two dimensions.

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4- A positive real number exceeds its multiplicative inverse by $\frac{6}{5}$ Find this number.

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5- If the age of Omar now is twice the age of Youssef and 2 years ago the difference between the squares of their ages was 15 years. Find the age of each of them now?

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Unit 2: Integer powers in R

Lesson 1: Non negative and negative integer powers in R

Board Summary

(1) Find in the simplest form:

1) $(\sqrt{2})^5 \times (\sqrt{2})^3 = (\sqrt{2})^{\cdots} = 2^{\cdots} =$ ---------

2) $(-\sqrt{5})^5 \div (-\sqrt{5})^3 = (-\sqrt{5})^{\cdots} = 5^{\cdots} =$ ---------

3) $\dfrac{(\sqrt{3})^{10} \times (\sqrt{3})^8}{(\sqrt{3})^{14}}$

Date: ……. /……. /…….

Evaluation

1- Choose:

(1) $3^0 + (\sqrt{3})^{-6} + (\frac{-1}{3})^3 =$ $\left[0\ ,\ \frac{1}{3}\ ,1\ ,\ 3\right]$

(2) $5^3 + 5^3 + 5^3 + 5^3 + 5^3 =$ ---------- $[5^9\ ,\ 5^{27}\ ,5^3\ ,\ 5^4]$

(3) The value of the expression $3^5 + (\sqrt{3})^{10} - 2\,(3)^5 =$ ----------

$\left[3^5\ ,(\sqrt{3})^5\ ,2(3)^3\ ,0\right]$

(4) $(3^{x+2} - 3^{x+1}) \div 3^x =$ ---------- $[3\ ,6\ ,9\ ,12]$

(5) $(4x)^0 =$ ----------, $x \neq 0$ $[0\ ,4\ ,x\ ,1]$

(6) One sixth of the number $2^{12} \times 3^{12} =$ ---------- $[6^{24}\ ,\ 6^4\ ,6^{11}\ ,\ 6^{13}]$

(7) The value of $(2)^0 \times (-\frac{1}{\sqrt{2}})^2 + (\frac{1}{\sqrt[3]{-8}}) =$ ---------- $[0\ ,\ 1\ ,\frac{1}{2}\ ,\ 2]$

(8) Quarter of $(4)^{20} =$ ---------- $\left[1^{20}\ ,\ 4^{19}\ ,4^{16}\ ,\ 4^5\right]$

2- Complete:

(1) $3^{-3} =$ ----------

(2) $(\frac{3}{2})^{-1} =$ ----------

(3) $(\frac{1}{2})^{-3} =$ ----------

(4) $(-\sqrt{3})^{-2} =$ ----------

(5) If $x = (\sqrt{5}+2)^9$, $y = (\sqrt{5}+2)^{-9}$ then $xy =$ ----------

2- Simplify:

$$\frac{2^{2x+1} \times 5^{2x+1}}{(10)^{2x}}$$

Date: ……. /……. /…….

Homework

1- Complete

(1) $3(7)^0 + 4$ = ……..

(2) $(\sqrt{5})^{-4}$ = ……..

(3) $(\frac{3}{2})^{-3}$ = ……..

(4) $(-\sqrt{5})^{-2}$ = ……..

(5) The simplest form of the expression $3^{-2} \times 3^{-3} \div 9^{-3}$……..

(6) $4^{3} \times 4^{-3} \times (3\sqrt{-8})^{-3}$ = …….. in the simplest form.

2- Find in the simplest form:

(1) $(\sqrt{3})^{-4} \times -\sqrt{2})^{4}$ = ……..

(2) $((\sqrt{3})^{-2})^{4}$ = ……..

(3) $= \frac{(\sqrt{5})^{-5} \times (\sqrt{5})^{-6}}{(\sqrt{5})^{-10}}$ ……..

(4) $\frac{8^x \times 9^x}{18^x}$ =……..

3- If $x = 2\sqrt{2}$, $y = 3$ find the value of $2(xy)^2 \times (\frac{x}{y})^2$

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Date: ……. /……. /…….

Remember

(1) $x^n = \underbrace{x \times x \times x \ldots\ldots\ldots\ldots\ldots \times x}_{n \text{ times}}$

(2) $x^n . x^m = x^{n+m}$

……

(3) $\frac{x^n}{x^m} = x^{n-m}$ *Where* $x \neq 0$

……

(4) $(x^n)^m = x^{nm}$

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……

(5) $x^{-n} = \frac{1}{x^n} = (\frac{1}{x})^n$ *Where* x

……

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(6) $(\frac{x}{y})^{-n} = (\frac{y}{x})^n$, $x, y \neq 0$

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(7) $(xy)^n = x^n y^n$

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(8) $(\frac{x}{y})^n = \frac{x^n}{y^n}$, $y \neq 0$

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Date: ……. /……. /…….

Unit 4: Areas

Lesson 5 : Areas of some geometric figures

Board Summary

Area of a rhombus = side length $\times$ ----------

Area of a rhombus = $\frac{1}{2}$ $of\ the\ product\ of$ ----------

$Area\ of\ a\ square =$ ----------

$Area\ of\ a\ square = \frac{1}{2}$ ----------

$Perimeter\ of\ rhombus =$ ----------

$Perimeter\ of\ a\ square =$ ----------

Area of a trapezium =

---------- $\times\ sum\ of\ the\ lengths\ of\ two\ parallel\ bases\ \times$ ----------

Area of a trapezium = $lenght\ of\ Middle\ base\ \times$ ----------

$The\ length\ of\ the\ Middle\ base =$ ……..

Date: ……. /……. /…….

Evaluation

(1) *Area of a rhombus whose diagonals lengths are* 8 *cm and* 6 *cm is* ---- cm^2

(2) *A square its diagonal length is* 10 *cm then its area* = ---- cm^2

(3) *The trapezium in which the lengths of the two parallel bases are* 3 *cm* , 7*cm and its height is* 5 *cm its area* = ------- cm^2

(4) *A square of area* 8 cm^2 *then its diagonal length* = ------- *cm*

(5) *A rhombus one of its diagonals lengths is* 6 *cm and its area is* 48cm^2 *then the length of the other diagonal* =------- *cm*

(6) *A rhombus of diagonal lengths* 6 *cm* , 8 *cm then its side length* =--- *cm*

Choose the correct answer

(1) *A rhombus of diagonal lengths* 10 *cm* , 6 *cm its area is* ------- cm^2

(60 , 30 , 16 , 120)

(2) *A trapezium, the length of its middle base is* 14 *cm and its height is* 5 *cm its area is* --------

(70 *cm* , 35 *cm* , 70 cm^2 , 35 cm^2)

(3) *A triangle its base length is* 5 *cm and its corresponding height is* 6 *cm its area is* ------- cm^2

(30 , 15 , 60 , 40)

(4) *A square of diagonal length* 8 *cm its area* = ---- cm^2

(64 , 16 , 32 , 24)

(5) *The ratio between the length of the diagonals of a rhombus is* 2: 3 *and the length of the smallest diagonal is* 6 *cm then its area* = ------- cm^2

(54 , 45 , 27 , 18)

(6) *A rhombus of diagonal lengths* 16 *cm* , 12 *cm its perimeter* = ------ *cm*

(20 , 10 , 40 , 28)

Date: ……. /……. /…….

Homework

(1) Complete:

(1) *A trapezium whose bases lengths are* 9 *cm and* 7 *cm then the length of its middle base* = ------- *cm*

(2) *A triangle its surface area is* 40 cm^2 *and the length of its base is* 8 *cm then its corresponding height* = -------*cm*

(3) *A rhombus of perimeter* 40 *cm and its height is* 8*cm then its area* = ------- cm^2

(4) *A rhombus of diagonals lengths* 2 *L cm and* 3*L cm then its area* = -------

(5) *A trapezium of bases lengths* 10 *cm and* 14 *cm and its area is* 84 cm^2 *then its height* = ---------*cm*

(6) *A triangle of area its diagonal length is* 13 *cm and its length is* 12 *cm its area* = --------- cm^2

(2) Choose the correct answer

(1) *A triangle of area* 30 cm^2 *and the length of its base is* 6 *cm then its corresponding height* = --------- *cm* (5 , 10 , 18 , 36)

(2) *A trapezium the lengths of its two parallel bases are* 5 *cm and* 7 *cm and its area is* 60 cm^2 *then its height* = --------- *cm* (5 , 12 , 10 , 72)

(3) *A square of area* 8 cm^2 *then its diagonal length* = ---------*cm*
(64 , 4 , 32 , 16)

(4) *A rhombus of area is* 42 cm^2 *and the length of one of its two diagonals is* 7 *cm , then the length of the other diagonal* = ------- *cm* (3 , 6 , 12 , 18)

(5) *A square of area* 36 cm^2 *then its perimeter is* ---------*cm*
(12 , 24 , 6 , 8)

(6) *The figure whose area* = $\frac{1}{2}$ *the square of its diagonal length is* ---------- (*rhombus , rectangle , square , triangle*)

(7) *A rectangle its length* = 4 *cm , its width is* 3 *cm then is diagonal length* = --------- *cm*
(7 , 12 , 5 , 6)

Date: ……. /……. /…….

Remember

$$\textbf{Area of a rhombus} = \frac{1}{2} \times d_1 \times d_2$$

$$\textbf{Area of a rhombus} = S \times h$$

$$\textbf{Area of a square} = S^2$$

$$\textbf{Area of a square} = \frac{1}{2}d^2$$

$$\textbf{Area of a trapezium} = \textbf{Middle base} \times h$$

$$\textbf{Area of a trapezium} = \frac{1}{2}(b_1 + b_2) \times h \quad or \left(\frac{b_1 + b_2}{2}\right) \times h$$

$$\textbf{Area of triangle} = \frac{1}{2} \times b \times h$$

$$\textbf{Area of a parallelogram} = b \times h$$

Date: ……. /……. /…….

Unit 5

Lesson 1 : Similarity

Board Summary

1-Complete

1- Two polygons are similar if the following two conditions are satisfied together.

a- the corresponding angles are equal in measure.

b- the corresponding sides lengths are proportional.

2- Two triangles are similar if one of the following conditions is satisfied.

a- the corresponding angles are……..

b- the corresponding ……..are proportional.

3-If the ratio of enlargement of two similar triangles equal to 1 then the two triangles are ……..

4- The two polygons which similar to a third polygon are ……..

5- If two polygons are similar and the ratio between the lengths of two corresponding **sides is 2:3 then the ratio between their perimeters is ……**

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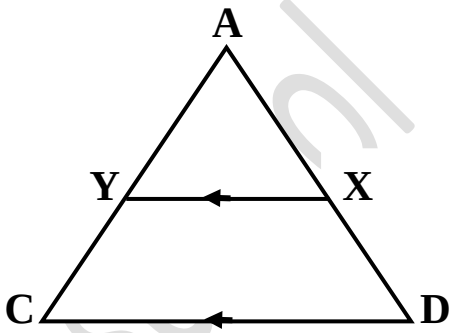
Date: ……. /……. /…….

Evaluation

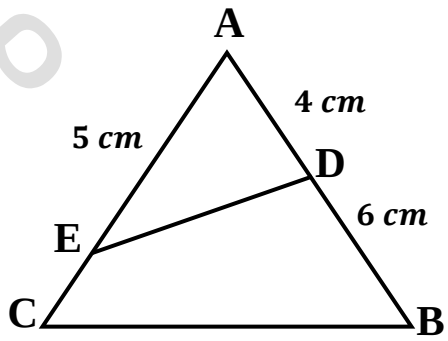
(1) ΔABC ,

$\overline{XY} \parallel \overline{BC}$, $AB = 5cm$, $AC = 4cm$, $AX = 3cm$, $XY = 3.6\ cm$



(2) $If\ m(\angle AED) = m(\angle B)$, $AD = 4cm$, $AE = 5cm$, $DB = 6\ cm$

$Prove\ that\ \Delta ABC \sim \Delta AED\ then\ find\ the\ length\ of: \overline{EC}$



Date: ……. /……. /…….

Homework

(1) ΔAXY , $\sim \Delta ABC$, $AX = 6cm$, $BX = 3cm$, $BC = 12cm$.
Find the length of $\overline{XY}$

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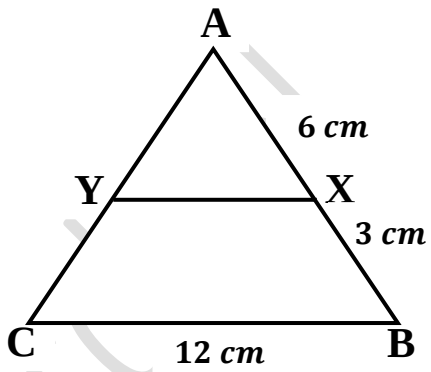

2-Complete

1- Two triangles are similar if the corresponding angles in the two triangles are …… or the corresponding sides are……..

2- If the ratio of similarity of two similar triangles =1 then the two triangles are ……

3-The ratio between the lengths of two corresponding sides of two similar polygons is $\frac{2}{3}$ then the ratio between their perimeters = ……

4- The polygons which similar to a third polygon are ……

5- If two polygons are similar then the corresponding sides lengths are ……

6- If $\Delta ABC \sim \Delta DEF$ and $m(\angle ABC) = (3x - 15)°$,
$m(\angle DEF) = (2x + 10)°$ then $x =$ ……

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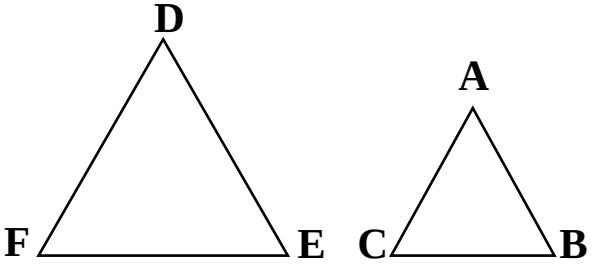

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Unit 5

Lesson 2 : Classifying triangles according to their angles

Board Summary

1) Determine the type of Δ ABC in each of the following cases:

a) AB= 8 cm , BC= 10 cm , AC= 14 cm

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b) AB= 6 cm , BC= 10 cm , AC= 8 cm

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……

c) AB= 4 cm , BC= 5 cm , AC= 6 cm

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2)Complete

1) A Triangle of sides lengths 7 cm , 24 cm , 25 cm its area = ……. cm^2

2)In ΔABC if $(AB)^2 = (AC)^2 - (BC)^2$ then ∠C is……

3) In ΔABC if $(AB)^2 + (BC)^2 - 3 = (AC)^2$

then ∠B is……

Date: ……. /……. /…….

Evaluation

1-Choose the correct answer

(1) $If\ ABC\ is\ an\ obtuse\ angled\ \Delta\ at\ B, AB = 5cm, BC = 3cm\ then\ AC$ $can\ be\ equals\ \ldots\ldots\ldots cm$ (4 , 5 , 7 , 8)

(2) $In\ \Delta ABC, AB = 5cm, BC = 12cm, AC = 15cm\ then\ the\ type\ of\ \Delta ABC$ $according\ to\ its\ angles\ is\ \ldots\ldots\ldots$ ($obtuse, right, acute$)

2) Determine the type of $\angle X$ in Δ XYZ where $XY = 12, YZ = 13$ cm $, XZ = 7$ cm

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Date: ……. /……. /…….

Homework

(1) $\Delta XYZ, XY = 8cm, YZ = 10cm, XZ = 7cm.$ *Determine the type of* ΔXYZ *according to its angles.*

……

……

(2) *Determine the type of* $\angle B$ *in* ΔABC *if* $AB = 3cm, BC = 5cm, AC = 5cm$

……

……

(3) *Find the area* Δ *of sides lengths* $6\ cm, 8\ cm, 10\ cm$

……

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(4)-Choose the correct answer

(1) *A triangle of side lengths* $3cm, 4cm, 5cm$ *its area equal* …… cm^2

(60 , 6 , 10 , 12)

(2) ΔABC *is acute angled triangle*, $AB = 6\ cm, BC = 8cm$ *then the length of* $\overline{AC}$ *can be* …… cm

(2 , 6 , 10 , 14)

Remember

*$In\ \Delta ABC\ if\ \overline{AC}$ *is the longest side then*

1) $If\ (AC)^2 > (AB)^2 + (BC)^2$ *then* ΔABC *is obtuse angled triangle at B*

2) $If\ (AC)^2 = (AB)^2 + (BC)^2$ *then* ΔABC *is right angled at B*

3) $If\ (AC)^2 < (AB)^2 + (BC)^2$ *then* ΔABC *is acute angled* Δ

***The length of any side in a triangle is greater than the difference between the lengths of the other two sides but smaller than the sum of lengths of the other two sides**

Date: ……. /……. /…….

Unit 5

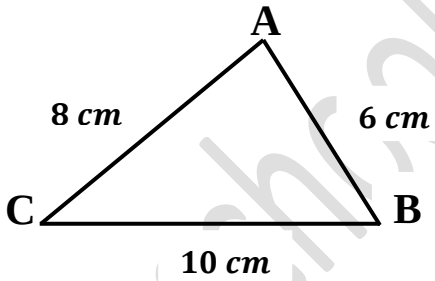
Lesson 3 : Converse of pythagoras theorem

Board Summary

$(\mathbf{1})(\boldsymbol{BC})^{\mathbf{2}} = (\boldsymbol{AB})^{\mathbf{2}} + (\boldsymbol{AC})^{\mathbf{2}}$

$\because (\boldsymbol{AB})^{\mathbf{2}} + (\boldsymbol{AC})^{\mathbf{2}} = (\boldsymbol{BC})^{\mathbf{2}}$

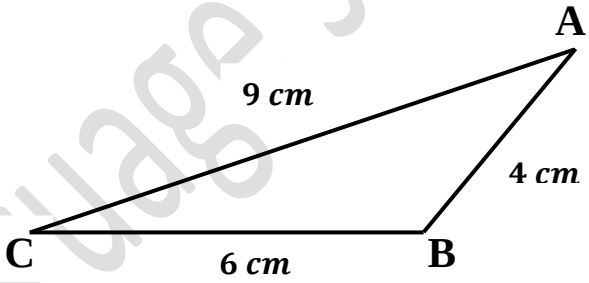
$\therefore \Delta\, \boldsymbol{ABC\ is}$ …… $\boldsymbol{at}$ **A**



$(\mathbf{2})(\boldsymbol{AC})^{\mathbf{2}} = (\boldsymbol{AB})^{\mathbf{2}} + (\boldsymbol{BC})^{\mathbf{2}}$

$\because (\boldsymbol{AC})^{\mathbf{2}} > (AB)^{\mathbf{2}} + (\boldsymbol{BC})^{\mathbf{2}}$

$\therefore \Delta\, \boldsymbol{ABC\ is}$ …… $\boldsymbol{at}$ **B**



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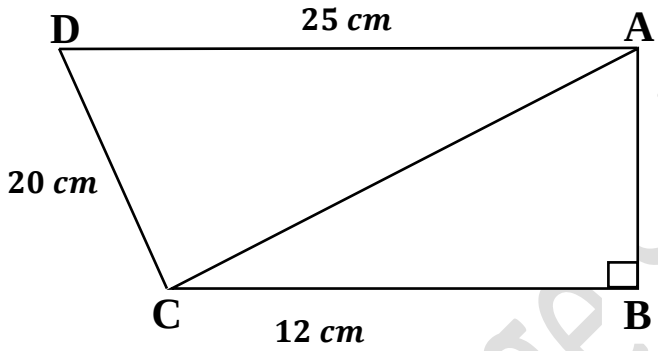
Evaluation

(1) ***In the opposite figure*:**
$m(\angle ABC) = 90°, AB = 9\ cm, BC = 12\ cm, CD = 20\ cm, AD = 52cm$
prove that $m(\angle ACD) = 90°$



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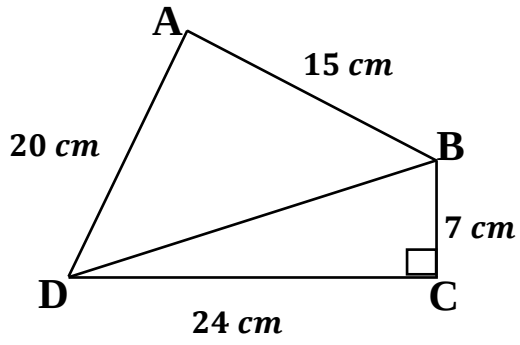
(2) ***In the opposite figure*:**
$m(\angle BCD) = 90°, AB = 15\ cm, BC = 7\ cm, CD = 24\ cm, AD = 24cm,$
prove that $m(\angle BAD) = 90°$



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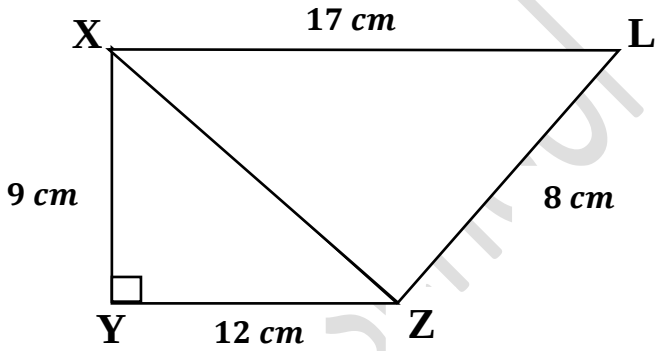
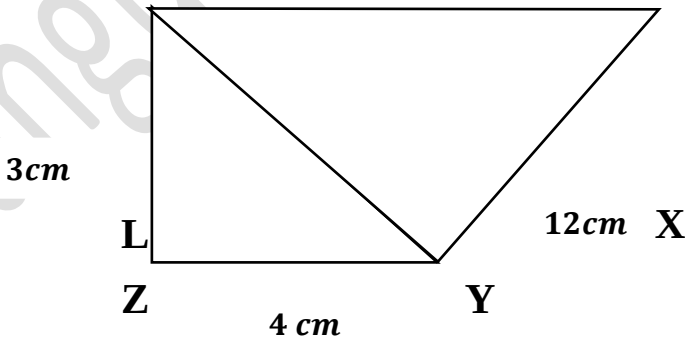
Date: ……. /……. /…….

Homework

(1) ***In the opposite figure*:**
$m(\angle XYZ) = 90°, XY = 9\ cm, YZ = 12\ cm, ZL = 8\ cm, XL = 17cm$
prove that $m(\angle XZL) = 90°$



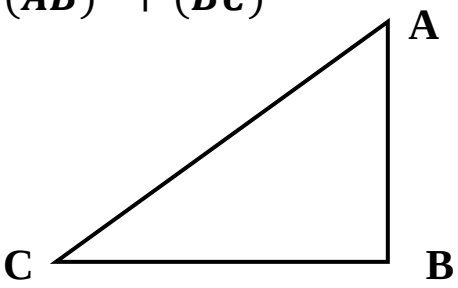
(2) ***In the opposite figure*:**
a*) *prove that $m(\angle XYL) = 90°$
b*) *Find the area of the figure $XYZL$



Remember

ΔABC ***right angled at*** B ***if*** $(AC)^2 = (AB)^2 + (BC)^2$

Area of $\Delta = \frac{1}{2} \times b \times h$



Lesson (6)
Factorizing by grouping

Factorize each of the following perfectly:

1. $a x + b x + a y + by$

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2. $am - an + m - n$

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3. $a^2 + 2ab + b^2 - c^2$

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Homework

4. $x y + 5 y + 7 x + 35$

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5. $5\ell - 10 m - a\ell + 2am$

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6. $9x^2 - 4a^2 + y^2 + 6xy$

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7. $abx^2 + bx - ax - 1$

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8. $25x^2 - 30x + 9 - 16y^2$

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9. $x^2 - 9a^2 + y^2 + 2xy$

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Lesson (8)
Solving quadratic equations in one variable algebraically

Complete each of the following :

1. If -5 is a root of the equation : $x^2 + 2x - 15 = 0$, then the other root is .....

2. If $x = 2$ is a root of the equation : $x^2 - 6x + k = 0$, then k = ... and the other root is .....

3. If one of the roots of the equation : $2x^2 + 8x = 0$ is a root of the equation : $x^2 + 5x + a = 0$, then a = ... or .....

Homework

4. If the number 9 is a solution of the equation : $x^2 + k = 0$, then k = ...

5. The solution set of the equation : $x^2 + 25 = 0$ in $\mathbb{R}$ is .....

6. The solution set of the equation $x^2 = 4x$ in $\mathbb{R}$ is .....

Choose the correct answer :

1. The S.S. of the equation : $3(x-2)(x+5) = 0$ in $\mathbb{R}$ is .....
(a) $\{0, 2, -5\}$ (b) $\{3, 2, -5\}$ (c) $\{2, -5\}$ (d) $\{-2, 5\}$

2. The S.S. of the equation : $x^2 - 4 = 0$ in $\mathbb{R}$ is .....
(a) $\{4\}$ (b) $\{4, -4\}$ (c) $\{2\}$ (d) $\{2, -2\}$

3. The S.S. of the equation : $x^2 + 25 = 0$ in $\mathbb{R}$ is .....
(a) $\{5\}$ (b) $\{5, -5\}$ (c) $\{-5\}$ (d) $\varnothing$

4. The equation whose roots are 3 and 5 is .....
(a) $5x^2 + 8x + 3 = 0$ (b) $2x^2 + 8x - 15 = 0$
(c) $x^2 - 8x + 15 = 0$ (d) $3x^2 + 8x + 5 = 0$

5. The S.S. of the equation : $x(x-3) = 5x$ in $\mathbb{R}$ is .....
(a) $\{3\}$ (b) $\{0, 3, 5\}$ (c) $\{3, 5\}$ (d) $\{0, 8\}$

6. The S.S. of the equation : $\frac{4}{x} = \frac{x}{9}$ in $\mathbb{R}$ is .....

(a) $\{4 , 9\}$ (b) $\{6 , -6\}$ (c) $\{6\}$ (d) $\{36\}$

7. If the number 4 is a solution of the equation : $x^2 + x - 20 = 0$, then the other solution is .....

(a) 20 (b) 5 (c) – 5 (d) – 4

Homework

8. The S.S. of the equation : $(x-4)^2 = 0$ in $\mathbb{R}$ is .....

(a) $\{4\}$ (b) $\{0 , 4\}$ (c) $\{0 , -4\}$ (d) $\{-4\}$

9. The solution set of the equation : $x(x-3) = 0$ in $\mathbb{R}$ is .....

(a) {3} (b) {0 , 3} (c) {0 , – 3} (d) {0}

10. If $3x^2 + cx - 6 = (3x-2)(x+3)$, then c = ...

(a) 7 (b) 12 (c) 13 (d) 5

11. The expression : $x^2 + 6x + a$ is a perfect square when a = ...

(a) 6 (b) 16 (c) 1 (d) 9

12. $x^3 + y^3 = (.....)(x^2 - xy + y^2)$

(a) $x^2 + y^2$ (b) $x^2 - y^2$ (c) $x + y$ (d) $x - y$

13. One of the factors of the expression : $x^2 - 3x - 18$ is .....

(a) $x - 3$ (b) $x - 6$ (c) $x - 9$ (d) $x - 18$

Find in R the solution set of each of the following equations:

1. $x^2 - 7x - 30 = 0$

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2. $2x^2 + 7x = 0$

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3. $(x+2)^2 = 25$

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	…… ……
4.	$(x-3)(x+5)=20$ …… …… …… ……
5.	$x-\frac{2}{x}=\frac{7}{2}$ …… …… …… ……
6.	$x(x-1)=6$ …… …… ……
7.	$3x^3=12x$ …… …… ……
8.	$x^3-4x=0$ …… …… ……
9.	$x^4-13x^2+36=0$ …… …… ……
10.	If : $x^2+\frac{1}{x^2}=34$, then find : $x+\frac{1}{x}$

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11. If : $x + \frac{1}{x} = 2$, then find : $x^2 + \frac{1}{x^2}$

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Homework

12. $x^2 - 5x - 6 = 0$

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13. $x^2 - 6x = -9$

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14. $x - \frac{3}{x} = 2$

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15. $x^2 - 5x = 0$

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16. $4x^2 = 25$

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Lesson (9)
Applications on solving quadratic equations in one variable algebraically

Complete each of the following :

1. Twice the square of the number x is .....

2. If the age of Bassim now is x years , then his age 3 years ago was ..... years.

Choose the correct answer :

1. If the age of Ayman 5 years ago was x years , then the square of his age now = ...
(a) $x^2 + 5$ (b) $x^2 + 25$ (c) $(x + 5)^2$ (d) $(x - 5)^2$

2. If the age of Bassim now is x years , then his age 3 years ago was ..... years.
(a) $3x$ (b) $x + 3$ (c) $x - 3$ (d) x^3

3. If the age of Amgad now is x years , then his age after 7 years will be ..... years.
(a) $7x$ (b) $x - 7$ (c) $x + 7$ (d) x^7

4. If the age of Ayman 5 years ago was x years , then his age now is ..... years.
(a) $x - 5$ (b) $x + 5$ (c) $5x$ (d) $\frac{x}{5}$

5. If the age of Sally 2 years ago was x years , then her age after 3 years from now will be ..... years.
(a) $x + 2$ (b) $x + 3$ (c) $x + 5$ (d) $6x$

6. If the age of Magdy now is x years , then the square of his age after 2 years is .....
(a) $x^2 + 2$ (b) $x^2 + 4$ (c) $(x - 2)^2$ (d) $(x + 2)^2$

7. If the age of Samy now is x years , then twice his age 5 years ago is ..... years.
(a) $x - 5$ (b) $2x - 5$ (c) $x - 10$ (d) $2x - 10$

8. Three times the square of the number x is .....
(a) $(3x)^2$ (b) $x^2 + 3$ (c) $3x^2$ (d) $\frac{x^2}{3}$

Essay problems:

1. A positive integer whose square is more than five times the number by 36

Find the number.

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2. An integer , if we add twice its square to the number 7 the result will be 135

Find the number.

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3. Find the real number whose double exceeds its multiplicative inverse by one.

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4. Find two real numbers whose product is 45 and one of them is 4 more than the other.

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5. The sum of the squares of two successive odd numbers is 130

Find the two numbers.

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6. The sum of three successive integers is equal to the square of their middle integer.

Find these numbers.

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7. Hatem is 4 years older than Hanan now , and the sum of squares of their ages now is 26

Find their ages now.

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8. A right-angled triangle, the lengths of the two sides of the right angle are $4x$ cm. and $x + 1$ cm. If the area of the triangle = 84 cm^2 , calculate the length of its hypotenuse.

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Homework

9. What is the real number which exceeds its multiplicative inverse by $\frac{5}{6}$?

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10. Find the rational number whose four times its square equals 81

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11. What is the real number if it is added to its square , the result will be 12 ?

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12. Find the dimensions of a rectangle whose length is 4 cm. more than its width and whose area is 21 cm^2

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Lesson (10)
Integer powers in $\mathbb{R}$

Non-negative integer powers in $\mathbb{R}$

If $a \in \mathbb{R}$, $n \in \mathbb{Z}^+$, then $a^n = a \times a \times a \times a \times a \times \cdots \times a$ where a is repeated as a factor n times.
The symbol (a^n) is read as : a to the power n or the n^{th} power of the number a or the base a

Negative integer powers in $\mathbb{R}$

If a is a real number , $a \neq 0$ and n is a positive integer , then :

$$a^{-n} = \frac{1}{a^n} \quad \text{and} \quad a^n = \frac{1}{a^{-n}}$$

If $a \in \mathbb{R}^*$ (The set of non-zero real numbers) , then : $a^0 = 1$

$(-a)^n = a^n$ if n is an even number

$(-a)^n = -a^n$ if n is an odd number

Remarks

1 For every $a \in \mathbb{R}^*$, $n \in \mathbb{Z}^+$, then $a^n \times a^{-n} = a^n \times \frac{1}{a^n} = 1$ (the multiplicative neutral)

i.e. a^n and a^{-n} are the multiplicative inverse of each other.

2 For every $a \in \mathbb{R}^*$, $b \in \mathbb{R}^*$ and $n \in \mathbb{Z}^+$, then $\left(\frac{a}{b}\right)^{-n} = \left(\frac{b}{a}\right)^n$

For example : $\left(\frac{2}{3}\right)^{-2} = \left(\frac{3}{2}\right)^2 = \frac{9}{4}$

Complete each of the following :

1. $(a^2 b^{\cdots\cdots})^4 = a^8 b^{12}$
2. If $(x-5)^{zero} = 1$, then : $x \in$ .....
3. If $a = 7^x$ and $b = 7^{-x}$, then : $a \times b =$ .....
4. If $x = \left(\sqrt{2}+3\right)^5$ and $y = \left(\sqrt{2}+3\right)^{-5}$, then : $x\,y =$ .....
5. $\left(\frac{5}{6}\right)^{-4} = \left(-\frac{\cdots\cdots}{\cdots\cdots}\right)^2$

6.	If $\left(\frac{1}{2}\right)^{x} = 5$, then : $(8)^{-x} =$ .....
7.	If $2^{x} = 7$, $2^{y} = 5$, then : $2^{x+y} =$ .....
8.	If $5^{x} = 3$, $5^{-y} = 7$, then : $5^{x+y} =$ .....

Choose the correct answer :

1.	$5^2 + 5^2 =$ ..... (a) 10^2 (b) 10^4 (c) 5^4 (d) 50
2.	$3^5 \times 2^5 =$ ..... (a) 5^{10} (b) 6^{10} (c) 6^5 (d) 6^{25}
3.	$(5\ a)^{zero} =$ ..... , $a \neq 0$ (a) 5 (b) a (c) 5 a (d) 1
4.	$3\ x^{zero} =$ ..... , $x \neq 0$ (a) zero (b) 1 (c) 3 (d) $3\ x$
5.	$3^{(2^3)} =$ ..... (a) 3^6 (b) 3^5 (c) 3^8 (d) 3^{32}
6.	🕮 $4^3 + 4^3 + 4^3 + 4^3 =$ ..... (a) 4^3 (b) 4^4 (c) 4^{12} (d) 4^{81}
7.	The quarter of the number $4^{20} =$ ..... (a) 1^{20} (b) 4^{19} (c) 4^{16} (d) 4^5
8.	4 times the number $2^8 =$ ..... (a) 2^{32} (b) 8^8 (c) 2^{10} (d) 4^8
9.	$\left(\sqrt{3}\right)^6 \times 3^4 =$ ..... (a) $\left(\sqrt{3}\right)^{24}$ (b) 3^{10} (c) 3^7 (d) $\left(\sqrt{3}\right)^{10}$
10.	🕮 The value of : $2^{20} + 2^{21} =$ ..... (a) 2×2^{40} (b) 2×2^{41} (c) 3×2^{20} (d) 3×2^{21}

11. 🕮 What of the following is closest to $11^2 + 9^2$?

(a) 22 + 18 (b) 211 + 29 (c) 120 + 20 (d) 120 + 80

12. 🕮 If $5^{x} = 4$, then 5^{x-1} = ...

(a) 1.25 (b) 0.8 (c) 0.125 (d) 0.08

13. 🕮 0.002×0.05 = ...

(a) 10^{-5} (b) 10^{-4} (c) 10^{4} (d) 10^{5}

14. $x^{m-1} \times$ ..... = 1 , $x \neq 0$

(a) x^{m-1} (b) x^{-m-1} (c) x^{m+1} (d) x^{-m+1}

15. $5 \times 5 \times 5 \times 2 \times 2 \times 2 \times 2 \times 2 = 4 \times$ .....

(a) 5^3 (b) 2^3 (c) 10^3 (d) $5^3 + 2^3$

Homework

16. $(5^2)^3$ = ...

(a) 5^6 (b) 5^5 (c) 5^{32} (d) 5

17. $2^5 + 2^5 + 2^5 + 2^5$ = ...

(a) 2^4 (b) 2^6 (c) 2^7 (d) 2^{20}

18. 🕮 Sixth the number $2^{12} \times 3^{12}$ is .....

(a) 6^2 (b) 6^4 (c) 6^{11} (d) 6^{23}

19. Fifth the number $\left(\sqrt[3]{5}\right)^6$ is .....

(a) 5 (b) 5^5 (c) 5^6 (d) 5^{12}

20. 🕮 The value of : $2^5 + \left(\sqrt{2}\right)^{10}$ = ...

(a) 2^6 (b) 2^{10} (c) $\left(\sqrt{2}\right)^{15}$ (d) $\left(\sqrt{2}\right)^{20}$

21. If $6^{x} = 11$, then 6^{x+1} = ...

(a) 12 (b) 22 (c) 66 (d) 72

22. 🕮 If $x = \frac{\sqrt{9}}{\sqrt{3}}$, then x^{-1} = ...

(a) $\frac{\sqrt{3}}{3}$ (b) $\frac{\sqrt{3}}{\sqrt{2}}$ (c) $\sqrt{3}$ (d) 2

23. 🕮 $(\sqrt{3}+\sqrt{2})^9(\sqrt{3}-\sqrt{2})^9 =$ .....

(a) 1 (b) $\sqrt{5}$ (c) $\sqrt{6}$ (d) 5

24. 🕮 The numerical value of the expression : $\frac{2^{2n+1}\times 5^{2n+1}}{10^{2n}}$ is .....

(a) $\frac{1}{10}$ (b) 7 (c) 10 (d) 100

25. $2^{2011} = 2^{2010} +$ .....

(a) 2 (b) 2010 (c) 2^{2010} (d) 2^{2011}

Find the value of each of the following in the simplest form:

1. 3^{-2}

2. $(\sqrt{5})^4$

3. $(-\sqrt{3})^{-2}$

4. $(0.01)^{-2}$

5. $(x^2)^{-3}\times(x^{-3})^{-2}$

6. $\frac{(x^2)^{-3}\times(x^{-1})^2}{x^{-3}\times x^{-4}}$

7. $(-\sqrt{5})^9 \div (-\sqrt{5})^5$

8. $((\sqrt{2})^3\times(-\sqrt{2})^2)^2$

9. $(\sqrt{3})^{-4}\times(-\sqrt{2})^4$

10. $((-5)^3)^2\times(-\sqrt{5})^{-4}$

11.	$\frac{(\sqrt{7})^{-4} \times (\sqrt{7})^{-3}}{(\sqrt{7})^{-9}}$
12.	$\frac{(\sqrt{3})^{5} \times (\sqrt{3})^{4}}{(\sqrt{3})^{3} \times 27}$
13.	$\frac{(10)^{2} \times (10)^{-7}}{(0.1)^{2} \times 0.001}$
14.	$\left(\frac{3\sqrt{2}}{2\sqrt{3}}\right)^{4}$
15.	$\frac{9^{x} \times 3^{x+2}}{(27)^{x}}$
16.	$\frac{(36)^{n} \times 5^{2n}}{(30)^{2n}}$
17.	$\frac{8^{n-1} \times 32^{-n}}{32 \times 4^{-n}}$
18.	$\frac{6^{n} \times 4^{n+\frac{1}{2}}}{(24)^{n}}$
19.	If $\frac{8^{x} \times 9^{x}}{18^{x}} = 64$, find the value of 4^{-x} ....
20.	If $a = \sqrt{3}$ and $b = \sqrt{2}$, find the value of : 1 $a^4 - b^4$ | 2 $\frac{a^4}{b^4}$

21. If $x = 2\sqrt{2}$ and $y = 3$, find the value of : $(x^2 - y^2)^3$

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Homework

22. $\left(\frac{1}{4}\right)^{-1}$

23. $\left(\frac{\sqrt{3}}{3}\right)^{-5}$

24. $x^3 \times x^{-2} \times x^{-1}$

25. $\left(\sqrt{2}\right)^2 \times \left(\sqrt{2}\right)^4$

26. $\left(\frac{-1}{\sqrt{2}}\right)^6$

27. $\frac{\left(\sqrt{3}\right)^7 \times \left(\sqrt{3}\right)^8}{\left(\sqrt{3}\right)^6}$

28. $\frac{\left(\sqrt{5}\right)^{10} \times \left(-\sqrt{5}\right)^5}{\left(\sqrt{5}\right)^{11}}$

29. $\frac{2^x \times 4^{x+1}}{8^x}$

30. $\frac{4^n \times 6^{2n}}{2^{4n} \times 3^{2n}}$

Lesson (16)
Areas of some geometric figures

The area of the rhombus = L × h where L is the side length and h is the height.

The area of the rhombus = $\frac{1}{2}$ of the product of the lengths of its two diagonals.

If the two legs of the trapezium are equal in length, then it is called an isosceles trapezium.
The following are the properties of the isosceles trapezium :

The two base angles of the isosceles trapezium are equal in measure.

The two diagonals of the isosceles trapezium are equal in length.

The isosceles trapezium has only one axis of symmetry which is the perpendicular bisector of its bases.

The area of the trapezium = half of the sum of lengths of the two parallel bases × height

The area of the trapezium = the length of the middle base × height

Complete each of the following :

1.	The area of rhombus whose perimeter is 20 cm. and height 4 cm. = ...
2.	The length of the diagonal of a square of area 50 cm^2 equals ..... cm.
3.	The length of side of a square whose area equals the area of a rectangle with dimensions 9 cm. , 16 cm. = ...
4.	The length of the middle base of a trapezium whose area = 30 cm^2 and height 5 cm. equals .....

Homework

5.	The area of the rhombus = the side length × ..... = $\frac{1}{2}$ of the product of .....
6.	The area of the square = the square of the length of ..... = $\frac{1}{2}$ .....
7.	The length of the middle base of the trapezium equals .....
8.	The area of the trapezium = half of the sum of lengths of the two parallel bases × ..... = the length of ..... × its height
9.	The base angles of the isosceles trapezium are .....
10.	The diagonals of an isosceles trapezium are .....

Choose the correct answer :

1. If the area of a square is 50 cm.^{2}, then the length of its diagonal = ...
(a) 25 cm. (b) 5 cm. (c) 10 cm. (d) 20 cm.

2. If the perimeter of a rhombus is 24 cm. and its area = 30 cm.^{2} then its height = ...
(a) 4 cm. (b) 5 cm. (c) 6 cm. (d) 12 cm.

3. If the product of the lengths of the diagonals of a rhombus = 96 cm.^{2} and its height is 6 cm., then its side length = ...
(a) 12 cm. (b) 8 cm. (c) 6 cm. (d) 4 cm.

4. If the area of a trapezium is 32 cm.^{2} and its height is 4 cm., then the length of its middle base = ...
(a) 4 cm. (b) 8 cm. (c) 14 cm. (d) 16 cm.

5. The trapezium in which the length of one of its parallel bases is 15 cm., and its area is 108 cm.^{2} and its height is 8 cm., then the length of the other base is .....
(a) 15 cm. (b) 4 cm. (c) 12 cm. (d) 27 cm.

6. The trapezium whose middle base length is x cm. and its height = $\frac{1}{2}$ the length of the middle base, its area = ... cm.^{2}
(a) x^2 (b) $\frac{x^2}{2}$ (c) $\frac{x^2}{4}$ (d) $\frac{x^2}{8}$

Homework

7. The area of rhombus is 20 cm.^{2}, the length of one of its diagonals is 5 cm., then the length of the other diagonal = ...
(a) 8 cm. (b) 4 cm. (c) 10 cm. (d) 15 cm.

8. The area of the square whose side length is 6 cm. ..... the area of the square whose diagonal length is 8 cm.
(a) > (b) < (c) = (d) ≡

9. The trapezium in which the lengths of its two parallel bases are 15 cm. and 11 cm. Its middle base is with length .....
(a) 26 cm. (b) 15 cm. (c) 13 cm. (d) 11 cm.

10. If the area of the trapezium is 450 cm^2, and the lengths of its two parallel bases are 24 cm. and 12 cm. , then its height = ...

(a) 12.5 cm. (b) 25 cm. (c) 36 cm. (d) 52 cm.

Find the area of the following figures:

1. A rhombus of side length 6 cm. and its height = 5 cm. « 30 cm^2 »

.....

2. A rhombus whose diagonal lengths are 24 cm. and 10 cm. « 120 cm^2 »

.....

3. A square whose diagonal length = 10 cm. « 50 cm^2 »

.....

4. A trapezium whose bases lengths are 8 cm. and 10 cm. and its height = 5 cm. « 45 cm^2 »

.....

5. A trapezium whose middle base length is 7 cm. and its height = 6 cm. « 42 cm^2 »

.....

Homework

6. A rhombus whose side length 12 cm. and its height = 8 cm. « 96 cm^2 »

.....

7. A rhombus whose diagonals lengths are 8 cm. and 10 cm. « 40 cm^2 »

.....

8. A square whose diagonal length = 8 cm. « 32 cm^2 »

.....

9. A trapezium whose bases lengths are 6 cm. and 8 cm. and its height = 12 cm. « 84 cm^2 »

.....

10. A trapezium whose middle base length is 12 cm. and its height = 8 cm. « 96 cm^2 »

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Essay problems:

1. A square whose area equals the area of the rectangle whose dimensions are 2 cm. and 9 cm. Find the length of its diagonal. « 6 cm. »

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2. 🕮 Two pieces of land have equal areas , one of them has the shape of a rhombus whose diagonals are 18 m. and 24 m. , and the other one has the shape of a trapezium whose height is 12 m. Find the length of its middle base. « 18 m. »

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3. 🕮 The area of a trapezium is 180 cm^2 and its height is 12 cm. Find the lengths of its parallel bases if the ratio between their lengths is 3 : 2 « 18 cm. , 12 cm. »

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Homework

4. Two land pieces are equal in area , the first is in the shape of a square and the second is in the shape of a rhombus whose diagonals lengths are 8 metres and 16 metres. Find the perimeter of the square-shaped piece. « 32 cm. »

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5. 🕮 Find the area of the rhombus whose perimeter is 52 cm. and the length of one of its diagonals is 10 cm. « 120 cm^2 »

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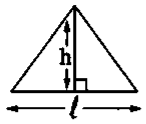
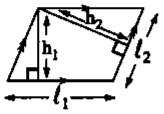
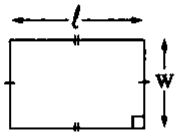
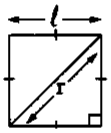
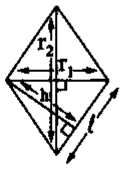
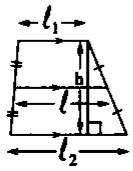
The figure		The perimeter	The area
The triangle		The sum of the lengths of its three sides	$\frac{1}{2}$ of the base length × height $= \frac{1}{2} \ell \times h$
The parallelogram		The sum of lengths of two adjacent sides × 2 $= 2 (\ell_1 + \ell_2)$	The base length × height $= \ell_1 \times h_1 = \ell_2 \times h_2$
The rectangle		2 (Length + Width) $= 2 (\ell + w)$	Length × Width $= \ell \times w$
The square		Side length × 4 = 4ℓ	Square of side length = ℓ^2 or $\frac{1}{2}$ of the square of its diagonal length = $\frac{1}{2} r^2$
The rhombus		Side length × 4 = 4ℓ	Side length × height = $\ell \times h$ or $\frac{1}{2}$ the product of the lengths of the two diagonals = $\frac{1}{2} r_1 \times r_2$
The trapezium		The sum of lengths of its sides	$\frac{1}{2}$ the sum of lengths of the two parallel bases × height $= \frac{1}{2} (\ell_1 + \ell_2) \times h$ or the length of the middle base × height $= \ell \times h$

Lesson (17)
Similarity

It is said that the two polygons P_1 and P_2 (of the same number of sides) are similar if the following two conditions are verified together :

1. Their corresponding angles are equal in measure.
2. The corresponding side lengths are proportional.

In this case , we write the polygon $P_1 \sim$ the polygon P_2

That means the polygon P_1 is similar to the polygon P_2

Remark (1)

In the two similar polygons P_1 and P_2 , the constant ratio among the lengths of the corresponding sides of P_1 and P_2 is called the ratio of enlargement or the drawing scale.

If the constant ratio is :

- Greater than 1 , then the polygon P_1 is an enlargement to the polgyon P_2
- Less than 1 , then the polygon P_1 is a minimizing of the polgyon P_2
- Equal to 1 , then the polygon P_1 is congruent to the polgyon P_2

Remark (2)

In order that two polygons are similar , the two conditions should be verified together and verifying one of them only is not enough to be similar.

Remark (3)

The congruent polygons are similar but it is not necessary that the similar polygons are congruent.

Remark (4)

All regular polygons of the same number of sides are similar.

Remark (5)

If each of two polygons is similar to a third polygon , then they are similar.

Remark (6)

The order of corresponding vertices should be kept in giving names of similar polygons that to help us finding the proportional sides lengths and the equal angles in measures.

i.e.

The ratio between the perimeters of two similar polygons = the ratio between the lengths of two corresponding sides.

A geometric fact :

The two triangles are similar if one of the two following conditions is verified :

1. The measures of their corresponding angles are equal.
2. The lengths of their corresponding sides are proportional.

Remarks

1. **The two right-angled triangles are similar if the measure of an acute angle in one of them is equal to the measure of an acute angle in the other.**
2. **The two equilateral triangles are similar.**
3. **The two isosceles triangles are similar if the measure of an angle in one of them equals the measure of the corresponding angle in the other.**

Complete each of the following :

1. If the measures of the corresponding angles in the two triangles are equal , then the two triangles are .....

2. If we have two polygons , their corresponding angles are .....
and their corresponding sides lengths are ..... , then the two polygons are similar.

3. If the ratio between the lengths of two corresponding sides in two similar triangles is equal to 1 , then the two triangles are .....

4. If two polygons are similar and the ratio between the lengths of two corresponding sides is 3 : 4 , then the ratio between their perimeters is .....

Homework

5. If two polygons are similar , then the corresponding ..... are equal in measure.

6. If two polygons are similar , then the corresponding ..... are proportional.

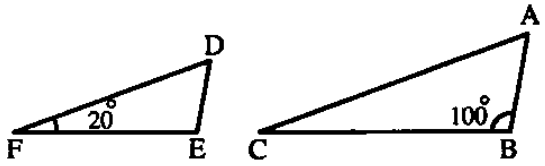
7. If each of two polygons is similar to a third , then they are .....

8. The two triangles are similar if the corresponding ..... are proportional.

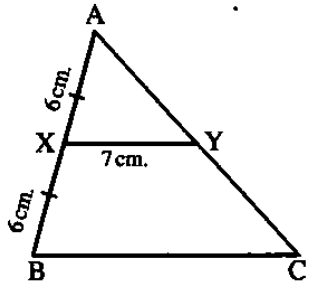
Choose the correct answer :

1. If the ratio between the lengths of two corresponding sides of two squares is 1 and the perimeter of one of them is 20 cm. , then the area of the other square = ...
(a) 20 cm^2 (b) 25 cm^2 (c) 16 cm^2 (d) 25 cm.

2. **In the opposite figure :**
If $\Delta ABC \sim \Delta DEF$, then m ($\angle A$) = ...
(a) 20° (b) 60°
(c) 80° (d) 100°



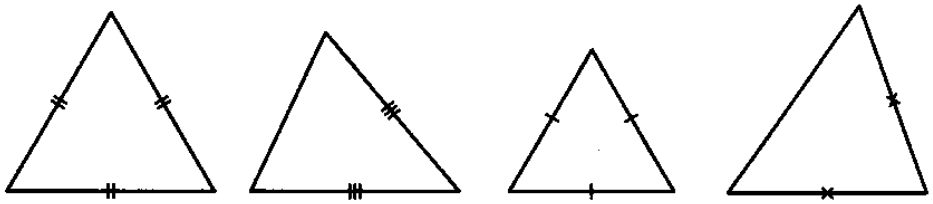
3. **In the opposite figure :**
If $\Delta ABC \sim \Delta AXY$,
AX = XB = 6 cm.
XY = 7 cm. , then BC = ...
(a) 6 cm. (b) 7 cm.
(c) 12 cm. (d) 14 cm.



Homework

4. If $\Delta ABC \sim \Delta DEF$ and $AB = \frac{1}{5} DE$, then perimeter of ΔABC = ... perimeter of ΔDEF
(a) 5 (b) 1 (c) $\frac{1}{5}$ (d) $\frac{2}{5}$

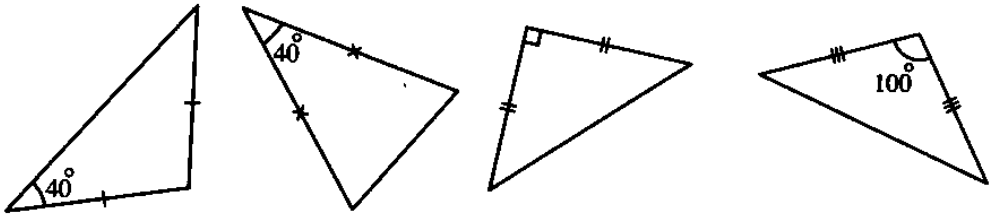
5. In the following figures , there are two similar triangles , they are .....



(1) (2) (3) (4)

(a) 1 , 2 (b) 1 , 3 (c) 1 , 4 (d) 2 , 4

6. In the following figures , there are two similar triangles , they are .....



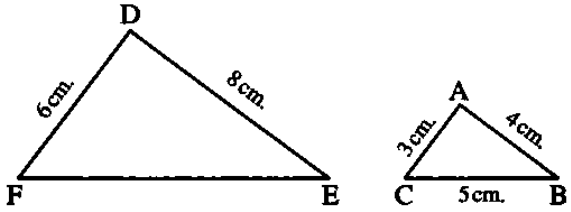
(a) 1 , 2 (b) 1 , 3 (c) 2 , 4 (d) 1 , 4

7. **In the opposite figure :**

If Δ ABC ~ Δ DEF , then EF = ...

(a) 5 cm. (b) 6 cm.

(c) 8 cm. (d) 10 cm.

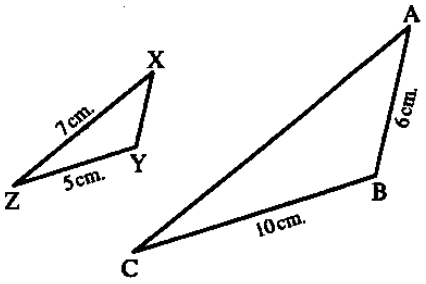


Essay problems:

1. **In the opposite figure :**

Δ ABC ~ Δ XYZ

Find : AC and XY « 14 cm. , 3 cm. »



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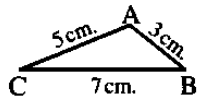
2.

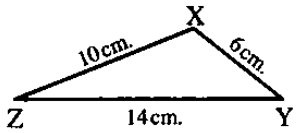
In the opposite figure :



1 **Prove that :** Δ ABC and Δ XYZ are similar.

2 If : m (∠ B) + m (∠ C) = 60° ,

find : m (∠ X) « 120°»



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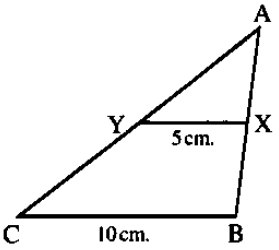
3.

In the opposite figure :

If Δ AXY ~ Δ ABC

XY = 5 cm. and BC = 10 cm. ,

Prove that : 1 $\overline{XY}$ // $\overline{BC}$ 2 Y is the midpoint of $\overline{AC}$



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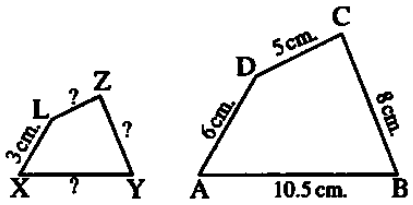
4. **In the opposite figure :**

The polygon ABCD ~ the polygon XYZL

If AB = 10.5 cm. , BC = 8 cm. , CD = 5 cm. ,

DA = 6 cm. and LX = 3 cm.



Find the length of each of : $\overline{XY}$, $\overline{YZ}$ and $\overline{ZL}$ « 5.25 cm. , 4 cm. , 2.5 cm. »

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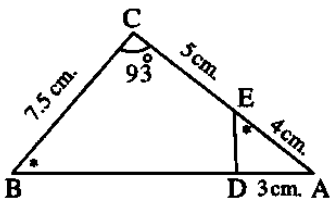
5. **In the opposite figure :**

ΔABC , $D \in \overline{AB}$, $E \in \overline{AC}$

, AE = 4 cm. , EC = 5 cm. , BC = 7.5 cm.

, AD = 3 cm. , m (∠ AED) = m (∠ B) and m (∠ C) = 93°



1 **Prove that :** $\Delta AED \sim \Delta ABC$

2 **Find the length of each of :** $\overline{BD}$ and m (∠ ADE) « 9 cm. , 93° »

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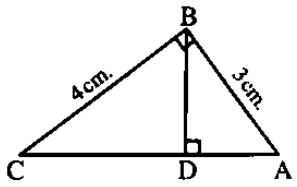
6.

In the opposite figure :

ABC is a right-angled triangle at B in which :

AB = 3 cm. , BC = 4 cm. and $\overline{BD} \perp \overline{AC}$



1 Prove that : $\Delta BAC \sim \Delta DAB$

2 Find the length of each of : $\overline{AD}$ and $\overline{DC}$ « 1.8 cm. , 3.2 cm. »

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7.

Two similar triangles, one of them has a perimeter of 74 cm. and the sides lengths of the other are 4.5 cm. , 6 cm. and 8 cm.

Find the length of the longest side in the first triangle. **« 32 cm. »**

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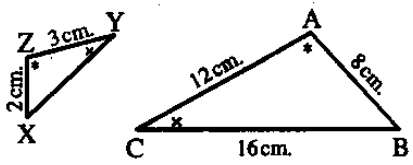
Homework

8. **Using the shown data in the figure , then prove that :**

Δ XYZ and Δ BCA

are similar , then find

the perimeter of Δ XYZ « 9 cm. »



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9. **In the opposite figure :**

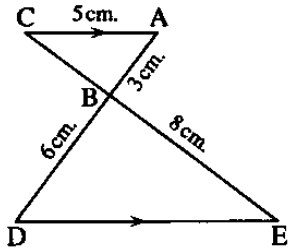
$\overline{AC} // \overline{ED}$, $\overline{AD} \cap \overline{CE} = \{B\}$

, AC = 5 cm. , BE = 8 cm. , AB = 3 cm. and BD = 6 cm.

1 Prove that : $\Delta ABC \sim \Delta DBE$

2 Find the length of each of : $\overline{BC}$ and $\overline{ED}$

3 Find : the ratio of enlargement.



« 4 cm. , 10 cm. , 2 »

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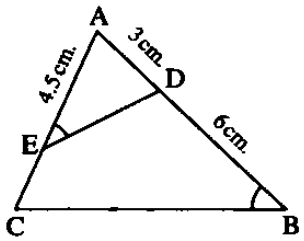
10.

In the opposite figure :



m (∠ AED) = m (∠ B) , AD = 3 cm.

AE = 4.5 cm. and BD = 6 cm.

1 **Prove that : $\Delta ADE \sim \Delta ACB$**

2 **Find the length of : $\overline{EC}$** « 1.5 cm. »

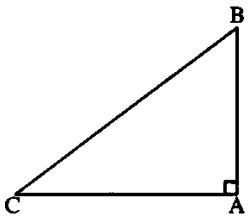
Lesson (18)
The converse of Pythagoras' theorem

We studied Pythagoras' theorem last year.

In the following , we will remind you of what you have studied.

If ABC is a right-angled triangle at A, then $(BC)^2 = (AB)^2 + (AC)^2$

Now we shall study the converse of Pythagoras' theorem.

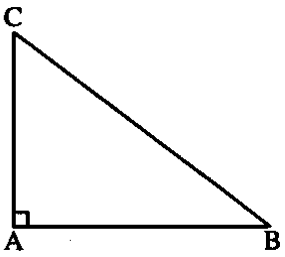


In a triangle , if the sum of the areas of two squares on two sides is equal to the area of the square on the third side, then the angle opposite to this side is a right angle.

In Δ ABC , if :

$(AB)^2 + (AC)^2 = (BC)^2$,

then : m (∠ A) = 90°



We can state this theorem as follows :

In a triangle, if the square of the length of a side is equal to the sum of the squares of the lengths of the other two sides, then the angle opposite to this side is a right angle.

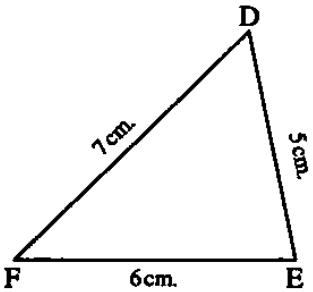
Corollary

In Δ ABC , if $\overline{AC}$ is the longest side and if $(AC)^2 \neq (AB)^2 + (BC)^2$, then m (∠ B) ≠ 90° and the triangle is not right-angled.

Complete each of the following :

Complete and show which of the following triangles is a right-angled triangle :

1

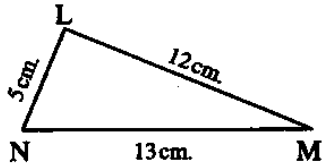


$(DF)^2$ = ...

$(DE)^2 + (EF)^2$ = ...

∴ The triangle is .....

2

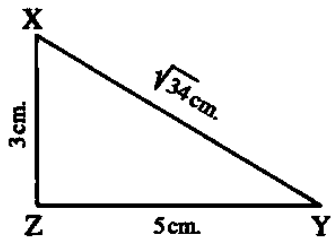


$(MN)^2$ = ...

$(ML)^2 + (NL)^2$ = ...

∴ The triangle is .....

3

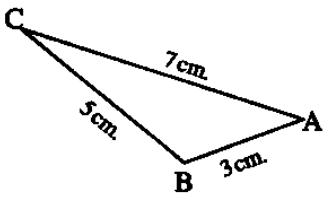


$(XY)^2 = (\sqrt{34})^2 =$ .....

$(YZ)^2 + (ZX)^2 =$ .....

∴ The triangle is .....

4



$(AC)^2 =$ .....

$(AB)^2 + (BC)^2 =$ .....

∴ The triangle is .....

Homework

In each of the following figures

Prove that : m (∠ B) = 90°

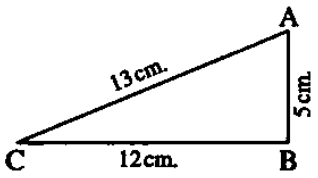


Fig. (1)

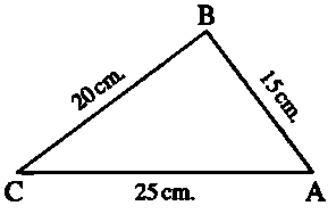


Fig. (2)

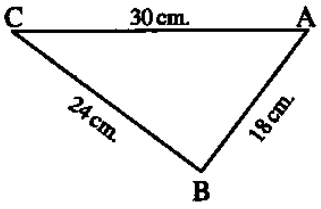


Fig. (3)

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Essay problems:

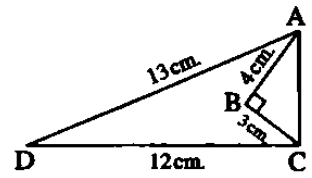
1.

In the opposite figure :

m (∠ B) = 90° , AB = 4 cm. , BC = 3 cm.

AD = 13 cm. and DC = 12 cm.

Find : The area of the figure ABCD



« 24 cm^2 »

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2.

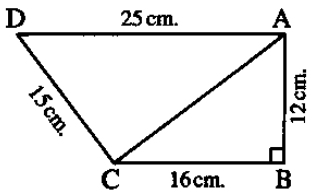
In the opposite figure :

ABCD is a quadrilateral in which : m (∠ B) = 90° ,

AB = 12 cm. , BC = 16 cm. , CD = 15 cm. and DA = 25 cm.

1 Find : The length of $\overline{AC}$

2 Prove that : m (∠ ACD) = 90°



« 20 cm. »

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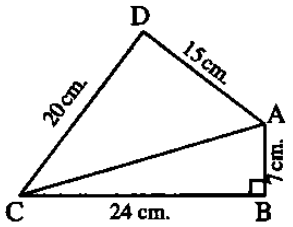
Homework

3. **In the opposite figure :**

ABCD is a quadrilateral in which : m (∠ ABC) = 90° ,

AB = 7 cm. , BC = 24 cm. , CD = 20 cm. and DA = 15 cm.

Prove that : m (∠ ADC) = 90°



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4. ABC is a triangle in which : AB = 4.5 cm. , BC = 7.5 cm. , AC = 6 cm.

Prove that : Δ ABC is right-angled.

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5.

In the opposite figure :

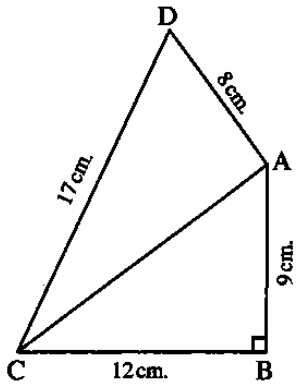
ABCD is a quadrilateral in which : m (∠ B) = 90° ,

AB = 9 cm. , BC = 12 cm. ,

CD = 17 cm. and DA = 8 cm.

Prove that : m (∠ DAC) = 90° ,

then find : The area of the figure ABCD « 114 cm^2 »



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